Interagency Task Force on Carbon Capture and Storage
Public Meeting

Geologic Storage – Needs and Barriers

George Peridas
Scientist, Climate Center

May 6th, 2010

Outline

Geological storage (GS) today

Seismicity

Lake Nyos

Risk Profile

Site Characterization

Property rights

Regulatory treatment of EOR (and GS)

GS today

- Natural analogues
  - Nature has trapped oil, gas, natural CO_2 and brines for millions to 100s of millions of years
- Industrial analogues
  - 100 years of natural gas storage
  - ~50 acid gas (H_2S + CO_2) injection projects in Alberta
  - 30 years, ~45Mt/yr of CO_2 injection for enhanced oil recovery
- 30+ cumulative years of major GS project operation
  - Sleipner (Norway), 1996
  - Weyburn (Canada), 2000
  - In Salah (Algeria), 2004
  - Snøhvit (Norway), 2008

Seismicity

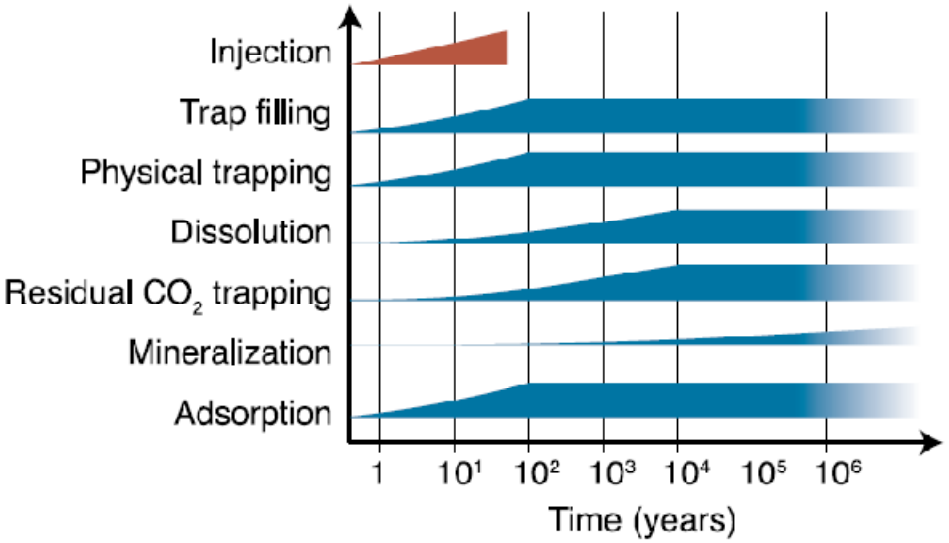
- Natural earthquakes happen constantly
- GS equipment can withstand substantial seismic events (Nagaoka project, Japan)
- Injection can cause seimicity
  - Could be discernible
  - Very unlikely to be catastrophic
- Methods for predicting and controlling this are well established
  - Study natural faults and fractures and seismic history, predict behavior under pressure
  - Do not site projects near areas prone to fault movement
  - Establish operational limits to avoid fault movement/fracture propagation that could cause significant seismicity
- Incorporate seismicity considerations in permitting and construction

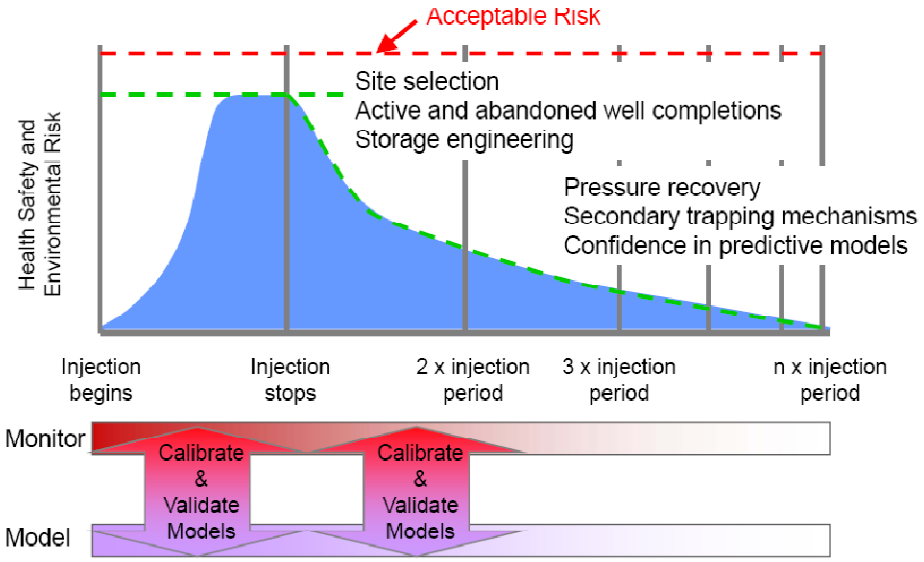
The Lake Nyos incident

- CO_2 constantly supplied to lake bed, 1.24Mt released overnight
- Lake water retaining CO_2 – not crust
- Special topography
- "not representative of the potential seepage through wells or fractures that may occur from engineered geological sequestration sites", [IPCC]

Risk profile of a GS project

- Risk typically highest during injection when pressures are highest
- Trapping mechanisms reinforce over time
- Inconsistent with calls for blanket indemnity
- A government entity should be tasked with long term monitoring, housekeeping and stewardship of sites

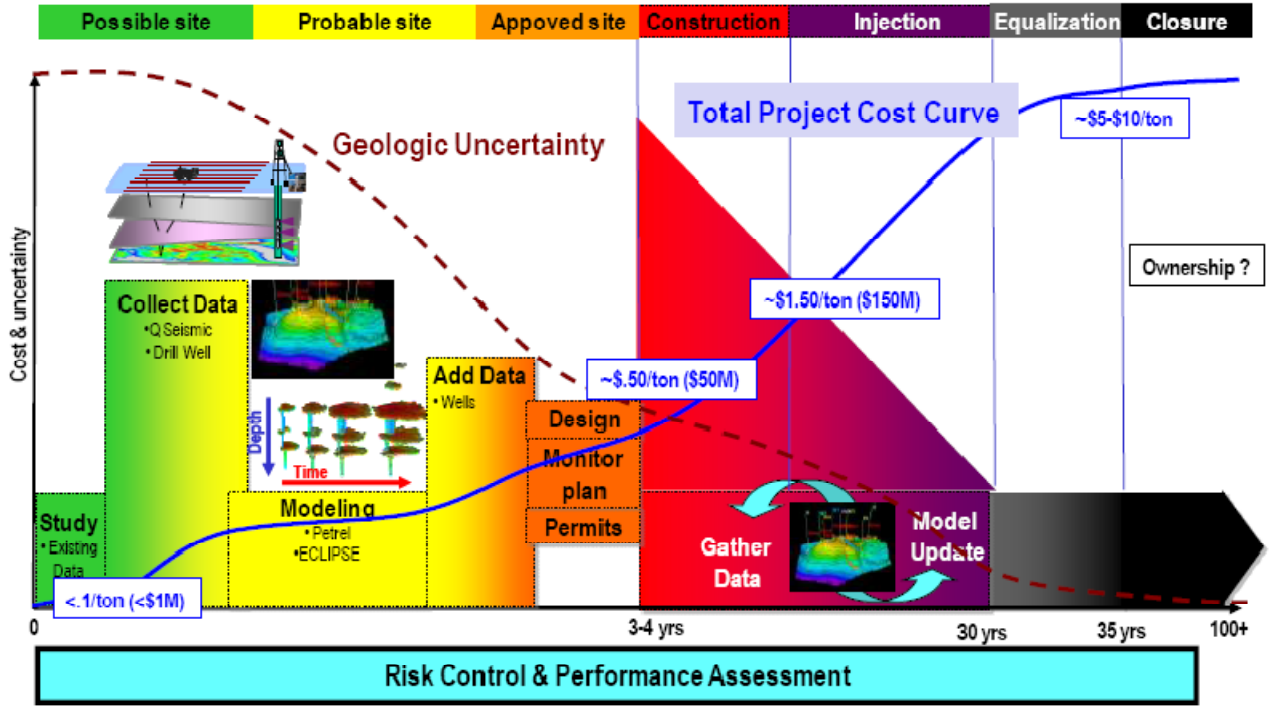




Credit: Sally Benson, Stanford University

Site characterization

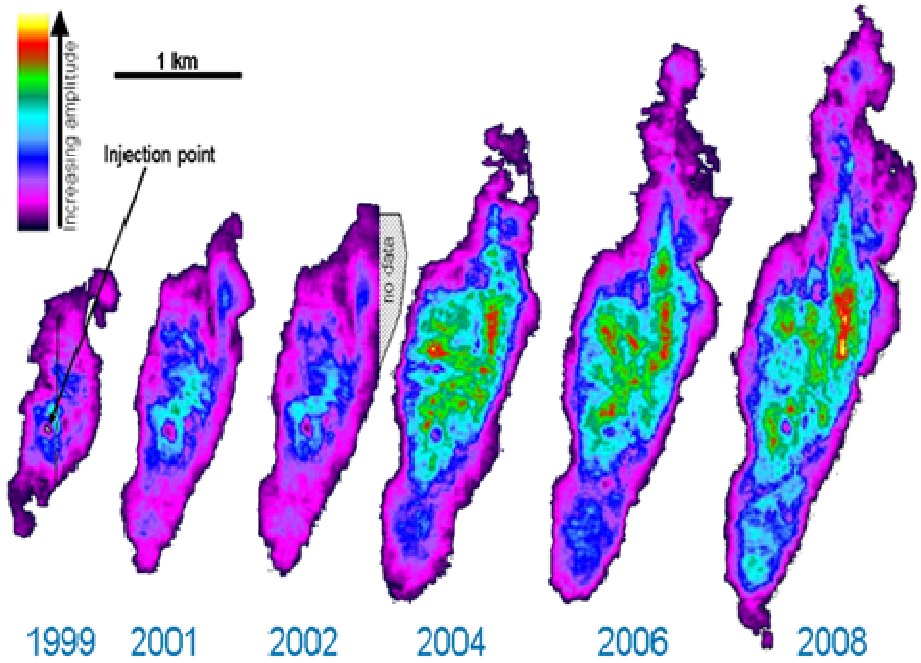
- Takes time and money
- Certainty increases as process advances
- Prospect ≠ proven site
- Identify strategic storage areas and begin characterization early



Credit: John Tombari, Schlumberger Carbon Services

Property rights

- CO_2 plumes likely to be:
  - Asymmetrical
  - 10s of miles in each major direction
- Pore space ownership and mechanisms for pooling injection rights need to be clarified
  - Should be equitable and reward owners for the economic value of CO_2 storage
  - Mechanisms such as eminent domain not always desirable or advisable



The regulatory treatment of GS

- UIC permit aims to groundwater (SDWA authority)
  - Lacks full authority to prevent atmospheric releases
- GHG Reporting Rule
  - Linkage to UIC permit?
  - Enforcement authority?
- EPA should exercise its Clean Air Act authority to regulate GS sites for the prevention of emissions to the atmosphere

- Will sequestration in oil/gas fields be covered?
  - The U.S. has a huge EOR potential
  - Climate legislation would unleash this
    - 3-3.6 million barrels per day by 2030, 40% of current imports
    - http://www.nrdc.org/globalWarming/cap2.0/bargain.asp
    - http://www.adv-res.com/unconventional-gas-literature.asp#EOR
  - Investors need certainty over the treatment of EOR
- Additional regulation needed to certify sequestration in oil/gas fields

Contact

George Peridas, Ph.D.

Natural Resources Defense Council

111 Sutter St. 20th Floor
San Francisco, CA 94104

415-875-6181
202-390-9453
415-989-0062
gperidas@nrdc.org